How ABB Extrel used contract manufacturing to cut costs and improve customer service

by Rick Schaeffer
ABB Extrel
Pittsburgh, PA

Abstract

Companies today are looking at outsourcing manufacturing as both a strategic and tactical way to cut costs. Synergistic with these cost-cutting programs is the corporate focus on maintaining core competencies. Often overlooked, at least in the early stages, is maintaining proper customer service on two levels: one is with contract manufacturer, another is with the end user. Properly managing both customers is a prerequisite for success.

This paper looks at the pitfalls and remedies that an organization may face in outsourcing manufacturing while focusing on managing customer service. The case history described is that of an electronics manufacturing company on the journey of outsourcing its manufacturing to a subcontractor. Several macro issues are discussed that serve as guidelines and lessons learned regarding outsourcing in general, and contract manufacturing in particular. As a result of the journey, this case history also exemplifies the chosen subcontractor as providing best-in-class customer service.

Preface

Although this paper addresses outsourcing and its impact on the end-user, it is important to the reader to provide a macro-view of outsourcing activities at our company. These preliminary steps, concerns, and solutions establish the framework to discuss the final obstacles in outsourcing electronics repair to a third party. In the end, nothing happens without a customer. In this paper, textual tense changes between past, present, and future to show the building, maintaining, and expansion of this relationship.

Definitions

Principal Manufacturer	ABB Extrel: designs, manufactures, sells, and services mass spectrometers.
Mass Spectrometer	Analytical instrument useful for detecting the quantity and quality of constituents in a gas stream.
Contract Manufacturing Subcontractor	Dynamic Manufacturing, Pittsburgh, PA

Situation analysis

Historically, managers of $10 million businesses find themselves needing the strengths and resources of a $50 million company. They build infrastructures and enormous staffs. They try to optimize their performance in every area, including marketing, sales, research, engineering, manufacturing, finance, and management. Yet most companies, since they are below minimum size, do not concentrate their efforts in any one area.

Business complications increase if these $10 million businesses are part of a larger international company. These matrix-managed organizations are constantly reviewing and mandating certain key metrics: IBT, positive cash flow, profitable growth, and inventory turns are important to business area managers while attention to quality and customer focus come from the corporate CEO.

> *We are similarly profligate in this county with respect to staff activities. Our motto seems to be: "Let's do a little bit of everything."*[1]

How does this small $10 million business focus on its business and customers while also meeting the demands of its matrix management?

Gap analysis

A gap analysis is analogous to playing football. One end zone is your situation analysis while the other end zone is your goal. You choose the proper strategy (plays) to move your ball (fill in the gaps) from one end to the other. If your strength is running, stick to it. If your strength is sales, rather than manufacturing, consider distribution as your focus. Some large companies had to learn the hard way that core competencies were more important than portfolio management.

> *Stick to the knitting – remaining with the business the company knows best.*[2]

Our gap analysis showed that we were not excellent, far from even good at manufacturing. The technical complexity of our products kept our knowledge resources focused on the technology of marketing, developing, and selling mass spectrometers. Manufacturing was a secondary operation. The balance between specialization and generalization kept on tilting back to specialization (mass spectrometers). One of the many simple remedies proposed was to increase core competencies by farming out non-core competencies.

> *And a company with excellence requirements that read like the headlines in the classified telephone book – "from accountancy" to "zipper repair" – is unlikely even to obtain mediocrity in any one area.*[1]

Vision

Our vision was and still is to offer, through development and marketing, the best mass spectrometer in our respective niche markets. To meet this vision we needed to focus our energies and talents on these core mass spectrometer competencies. Secondary and tertiary skills if they were not essential to our business had to be eliminated.

> *Vision is much more "down and dirty doing" than fancy plans and words. Vision flows from extensive contact with customers and suppliers.*[3]

> *Reengineering begins with a vision, a mandate, and a concept, not with detailed specifications. The shape of the outcome does not emerge until one is well into it.*[4]

Tactical plan

To focus on core competencies (mass spectrometry), we needed to outsource as many other functions as much as possible. As Drucker attests to time and time again, you should outsource functions that do not offer personal opportunities for growth. If you have limited resources, you cannot expect to be everything to everybody. Your size restricts your mastering all the technical and business knowledge to be the best at everything. You should contract out generic functions to firms that have no other business, understand their work, respect it, and offer opportunities for advancement for low-skill workers.[1]

Action plan

To focus on core competencies, we decided to farm out subassembly manufacturing. Our manufacturing mission changed from full manufacturing to final assembly and final testing. If manufacturing functions did not meet this requirement, then they were targeted for outsourcing. Our electronics manufacturing area (boards, chassis, and cables) especially did not have the criteria to be successful (critical mass, limited opportunities for advancement). Nor did electronics manufacturing fit our final assembly and final test criteria. Early to mid-on it was noted that electronics outsourcing would provide the biggest win and ultimately leverage all other manufacturing improvements. It should be noted that although we are outsourcing electronics manufacturing, we are not outsourcing electronics design. Design, research, and development of mass spectrometers are core to sustaining our growth.

Mission

KISS 2000 is an acronym that was chosen to capture the essence of our mission. KISS stands for **K**nowledge, **I**nventory, **S**peed, and **S**ensitivity. The year 2000 was our targeted date for complete implementation of this plan. The start date was September 1997.

Knowledge

As noted before, a company cannot maximize its knowledge base in every operation. We choose to train our manufacturing electronic technicians in basic mass spectrometry. We believe that the more knowledge an employee can gain (especially in core competencies) the better off the company and the employee is in the long run. As opportunities for advancement open up (assuming business growth), the previous electronic technicians could step into final testing functions. Could step is misleading; rather it is strongly suggested that manufacturing employees bid on other opportunities in the company. (This stems from the decreasing headcount requirements as we continuously outsource.) It was further important to train these employees in our final stages of assembly and test, as their present jobs were targeted for extinction.

> *A mission is a clear, definable and motivational point of focus -- an achievable goal, a finish line to work towards. Leaders are most effective when they translate a broad and enduring purpose into a specific, gut grabbing mission that people can sink their teeth into.* [5]

Let us not forget that training and knowledge attainment is not a one-way street. These individuals have to take some ownership in their own training. There is no guarantee of lifetime employment in companies today. Furthermore, much like the road crew that can pave a road and you choose your car, so can a company provide opportunities for advancement, and you choose your path.

Inventory

Marketing and manufacturing scenarios define correct inventory levels. Fully one-third of our sales revenue was and still is tied up in materials cost. Our inventory turns at this time (circa summer 1997) were a dismal 2.5. We set a lofty target of reaching turns of 5.0 by the end of the year 2000. Strategically this company's senior staff felt that to reach these inventory turns, we would need to give supply management programs the utmost attention. We needed to switch from a classical buyer/procurement status to that of a partnering status. Supply management responsibility, both strategic and tactical was assigned (assumed) to the manufacturing manager. Not knowing it at the time, but primary supply management would be an all-encompassing way of life. The bulk of manufacturing issues would

eventually come down to managing the supply base. The plurality of inventory transactions at this time was devoted to electronics activity. As such this made the most sense (in hindsight) to farm out in its entirety, including customer electronics repair.

Speed

Circa 1997's cycle times were a problem. We were routinely missing customer delivery expectations. Our manufacturing systems were antiquated push scenarios coupled with inefficient in-house subassembly manufacturing. Time to market and time to deliver is crucial to obtaining and retaining customers. Meeting customers' delivery expectations is a subjective advantage over the competition. It is difficult to rank it objectively; it does not have a product feature or a strong advantage position. Yet the benefits to the customer of on-time delivery can make or break long time (and profitable) customer relations. It is always easier to retain an existing customer than to court a new customer.

Sensitivity

Sensitivity can be captured as applying the golden rule, "Do unto others as you want them to do unto you." Although it is easy to paraphrase, it is more difficult to put into practice. Human interactions are not a pure science, and as such they don't fit easily onto management charts. What we can say here is that we will strive, albeit with foot-in-the-mouth disease at times, to be sensitive to our stakeholders wants, wishes, and desires. The uprooting and complete elimination of electronics manufacturing and repair at our company could and did strike concern at the heart of manufacturing employees (internal customers.) An underlying assumption in these outsourcing plans was not to lay off any employees.

> *Have a collegial, supportive, yeasty, zany, laughter-filled environment where folks support one another, and politics is as absent as it can be in a human (that is, imperfect) enterprise.*[6]

Focus on reengineering

For reengineering to work, it must be #1 on your priority list, and if at all possible the only item on your priority list. Reengineering usually does not work if the reengineering manager is juggling too many balls. In our case, the reengineering manager was also the manufacturing manager. To be successful in outsourcing while not forgetting our customers, we needed to bring all manufacturing and manufacturing engineering tasks under the umbrella of one program. We choose to build a supply management umbrella that would drive our reengineering efforts. The supply management team members came from engineering and manufacturing.

Supply management

Enormous resources are available to be leveraged through your supplier companies. If proper supply management actions and relations are established, then organizations can expect to reap the following measurable benefits:

- Reduced operating cost
- Higher profits
- Shortened cycle times
- Faster applications of best practices and new technologies
- Faster new product development
- Long-term quality improvement

> *Most manufacturers still have to learn what some of the large retailers grasped thirty or forty years ago: Buying is as important as selling; and the best selling cannot make up for a mediocre buying specification.*[1]

> *Supply Management's main purpose is to optimize the ultimate value to your customer.*[5]

Reengineering considerations

People

Usually this is the number one source of difficulty in reengineering. Your employees will equate any reengineering efforts with downsizing and large scale layoffs. You must be careful that you match your outsourcing programs (with reduced internal headcount) with normal employee turnover and attrition, less you forever spoil the outcomes that you strive for. You must be consistent in communicating your message. You should use every avenue and issue as a fulcrum to reiterate the reengineering message, because no matter how you say it, what people will hear is "I'm going to get fired." The key to reengineering is to communicate, then communicate again, and again, and so on. An underlying assumption in these outsourcing plans was not to lay off any employees.

> *If you concentrate on the logical and design issues without considering the personal concerns of the people who actually do the work, the reengineering effort will inevitably sink under the weight of self-interest.*[4]

Cost

Outsourcing if performed well will lead to lower operating and manufacturing costs. In most cases, you are reducing the total cost of ownership (TCO) by continuously improving your internal processes. Our original intent in outsourcing electronics was to concentrate only on assembly and possibly board testing. We learned along the way that it was better to contract 100% of our electronic needs to our subcontracting partner. Our partner's core competencies are in and only in electronics manufacturing. It is by totally eliminating a department that true cost savings can occur.

> *En route to seeking opportunities for improvement, one often trips and falls over a chance for real innovation that was previously overlooked.*[5]

> *But eliminating an entire operation is by far the most effective way to cut costs and the only one likely to produce by itself permanent cost savings.*[7]

Quality

The naysayers will tell you that the company that you are outsourcing to cannot build the product as well as you can build the product. They will tell you that we are ISO 9001 certified, and we employ excellent processes and systems.

> *The quality movement is essentially incremental in its worldview; it employs a set of structured problem-solving techniques whose purpose is to isolate narrowly confined difficulties within existing processes in order to apply focused solutions to them. By contrast, reengineering takes a macro-perspective; it doesn't seek to solve problems in an existing process but rather to discard the process entirely and to replace it with something new.*[4]

It is important to note that obtaining an ISO certification only certifies your processes and not your product. It is imperative that your supply partners have their own quality processes.

Reducing the magnitude of your quality issues is inherent in outsourcing. In our company, this is no more evident in electronics outsourcing. On an average there are 100 components per board. The quality issues for these 100 components migrate to your supply manager, with the Principal Manufacturer addressing only one issue (per board).

Vendors

Reengineering through outsourcing will not work without the support and buy-in of your selected vendors. The stronger principal/contractor relations are really partnerships, akin to a marriage. Like a marriage, both parties share in the rewards and take mutual solace during economic downturns. This partner's business must have key managerial strengths, a viable work force, be financially sound, and intrinsically care for their people.

Our selected electronics subcontracting vendor (Dynamic Manufacturing) meets and exceeds these requirements. Some examples of meeting or exceeding customer expectations are:

- Competitive cost structures
- Reduction in principal's inventory
- Saves transactional expenses for the principal by supplying
  - Purchasing
  - Quality
  - Shipping
  - Receiving
  - Human Resources
- Absorb a host of quality issues
- Provides direct labor to the principal when asked
- Principal can purchase component parts at cost
- Holding blanket order releases until principal requires them JIT

Vendor paradigm

Under the old system (ABB Extrel producing) there was always the balancing of new manufacturing or customer repair. Extrel uses the same people for both new production and service repair. Our in-house paradigm did not permit the opportunity to stock up on finished assemblies. So when a repair needed to take place, we had to sacrifice new (monthly) manufacturing for customer repair satisfaction. Under this in-house paradigm, we were constantly struggling with balancing old work versus new work.

> *With the publication of Thomas Kuhn's book, The Structure of Scientific Revolutions, the word paradigm came to mean the fundamental assumptions about the nature of the world, particularly in the sciences. In fact Kuhn said that a field was not a science unless it had a paradigm. Furthermore, a scientific revolution occurs when there is a paradigm shift. The last great paradigm shift was the Copernican or scientific revolution in which Copernicus overturned the Ptolemaic paradigm that the earth was the center of the known universe. This change had enormous effects on science, and on all the reigning institutions of the day, especially the church, as it eventually relinquished its leading role in society to science.*[8]

Dynamic Manufacturing's customer paradigm is radically different than Extrel's. Unlike ABB Extrel, Dynamic is privately owned, with no outside influence setting their inventory issues. Dynamic purchases one year's worth of parts inventory at one time (exercising tremendous buying power). They subsequently inspect the full lot of inventory at receiving and forward this "quality" parts inventory over to their assembly area. Dynamic Manufacturing builds at least a three-month supply of Extrel boards at one time. In some cases, they may build the complete year's blanket order at one time. This manufacturing system works for them and provides flexibility to meet the customer's (at times) erratic plans. This manufacturing paradigm offers them flexibility to address ABB Extrel's service repair in a JIT manner.

Principal/subcontractor relationship

ABB Extrel approached Dynamic Manufacturing (and other candidates) in August 1997 to explore outsourcing electronic boards. A few exploratory RFQs (request for quotations) were sent to them to bid on. After a few rounds of site visits and some minor negotiations, we were ready to begin our journey.

Dynamic's approach to bidding was and still is:

- Dynamic would accept kitted parts to be built and assembled. They would build the boards and charge direct labor to Extrel. This scenario allowed them to learn the assembly process so to provide a competitive bid.
- It would take nearly a month for Dynamic to come back with a bid. We would accept the bid.
- Dynamic would continue to accept kitted parts from Extrel while they acquire the needed inventory to build the boards outright.
- Dynamic's parts would arrive and the kitting would stop.
- Dynamic would build, assemble and deliver the boards to Extrel.
- Dynamic would send an electronics test technician to Extrel to learn how to test and calibrate these boards. Dynamic would charge direct labor to Extrel for their test time.
- This sequence of events would continue for other boards, ultimately leading to Dynamic Manufacturing building all ABB Extrel Boards.
- This scenario worked so well, that Extrel asked Dynamic to entertain the feasibility of building electronic chassis and card cages.
- Dynamic started the same kitting, acquiring pricing information, and building scenario that worked so well for boards.
- Dynamic would accumulate test times on these boards in preparation for supplying a complete bid to Extrel (100% subcontracted manufacturing, testing, and 1 year warranty).

Board testing presented challenges

It was concluded that for Dynamic Manufacturing to test these boards, they needed Extrel's test fixtures. ABB Extrel did not feel that Dynamic should replicate the cost of these test fixtures at their cost. Why have two sets of expensive test fixtures? It would be better for Extrel to loan the test fixtures to DM for test purposes.

Problem:

Board testing presented the following issues:

- Extrel needs access to these test fixtures for use in repairing customer property.
- Extrel needs access to these test fixtures to aid in troubleshooting modules if they failed in our final test processes.
- Logistically Dynamic would require these test fixtures at their facility.
- It is inconvenient for either party to travel back and forth between our companies to share test fixtures.

Solution:

Extrel proposed and Dynamic agreed that Dynamic take over complete electronics manufacturing, testing, and repair. (The repair of older model electronics, would fall outside the scope of this relationship.)

This solution presents further issues:

- Transfer of knowledge from Extrel to Dynamic.
- Complete documentation of test fixtures.
- Complete documentation of chassis assemblies.
- Customer service.
- Packaging for shipping (one size box does not fit all boards). We need to have Dynamic Manufacturing put ABB Extrel labels on the shipping boxes.
- Instructions (communications) to customers (existing problem).
- Non interlocking work schedules (hours of operation).

Keeping customers happy through service repair

The final stage in outsourcing electronics manufacturing pertains to repair of customer property. Mass spectrometers are inherently expensive capital equipment products. If they break then the customer usually needs a fast repair turn around (cycle time).

There are a variety of established ways to handle service repair, including:

- Actual repair and return of individual customer property.
- Stocking a supply of used, repaired and warranted electronic modules. We would send these modules to the customer and they would in turn send the defective one back to us for repair and subsequent restocking.
- Stocking a supply of new electronic modules that can be swapped for the customer's defective module, or outright sold to the customer.

The following customer service scenarios address the customers' immediate need (to get back up and running ASAP).

Scenario 1

Actual repair of direct customer property needs to occur as rapidly as possible. (Our internal goal is to provide a three-day turn around.) With Dynamic's build-ahead philosophy, there should be ample time to repair an Extrel board while satisfying a three-day turnaround. We need to define a general rule-of-thumb to known when to quit putting repair time in a board (when to pull the plug).

Scenario 2

Maintaining a facility of used/warranted modules is conceptually easy. Cycled boards are routed to Dynamic for repair. The repaired boards are routed back to Extrel for service inventory storage.

Scenario 3

This scenario requires Dynamic to have in stock ample inventory to cover Extrel's new manufacturing demands as well as meeting erratic service demands. In most cases, these modules and boards can ship directly from Dynamic to the customer. Some boards would need further testing in our final system. In these cases, the Dynamic repaired boards would be routed back to Extrel to complete the process.

Customer service administration

The administrative functions to handle customer service remain the responsibility of ABB Extrel. The end user will always call Extrel's service department for help. Extrel would direct the customer to take certain action. Some action issues would require the customer to send the board back to Extrel for repair or exchange. It is postulated that the boards could be shipped to ABB Extrel c/o Dynamic Manufacturing at Dynamic's address.

ABB Extrel will retain customer invoicing. In some cases (export), the invoice needs to be attached to the shipping box. We will need to develop a plan to address this issue.

Fast forward

In the end, ABB Extrel will have reduced transactional and handling costs, our key partner will have increased his revenue stream and we will have decreased the cycle time for customer fulfillment.

Acknowledgements

I wish to thank ABB Extrel's employees for allowing me the freedom to pursue these manufacturing challenges. I am indebted to the supply management team at ABB Extrel for their in-depth understanding of our vendors, our processes, and our commitment. I am grateful to the superb customer service programs and partnering of Dynamic Manufacturing; this mission would not be fulfilled without this relationship. In closing, I am forever thankful to my wife, Alice, who has put up with me for these many years. "Caring and sharing are the secrets to living."

References

1. Drucker, Peter F., *Managing for Results.* New York: Harper Collins Books, 1964.

2. Peters, Thomas J. and Waterman, Robert, *In Search of Excellence.* New York: Warner Books 1982.

3. Belasco, James A. and Stayer, Ralph C., *Flight of the Buffalo*. New York: Warner Books 1993.

4. Hammer, Michael and Stanton, Steven, *The Reengineering Revolution.* New York: Harper Collins Books, 1995.

5. Riggs, David A. and Robbins, Sharon L, *The Executive's Guide To Supply Management Strategies*. AMACOM, 1998.

6. Peters, Tom, *The Pursuit of WOW!*, New York: Vintage Books, 1994.

7. Drucker, Peter F., *Managing for the Future.* New York: Truman Talley Books, 1992.

8. Collins, James C. and Porras, Jerry I., *Purpose, Mission, and Vision: The New Paradigm in Business*, edited by Ray, Michael and Rinzler, Alan: New York: Putnam Books 1993.